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ABSTRACT

The study examined the effectiveness of two psychoeducational treatment approaches and drug therapy on the impulsivity of 120 hyperactive emotionally disturbed children in two age groups (mean ages 13 and 8 years old). The psychoeducational approaches tested were modeling of reflective behavior and a specific instructional procedure to increase reflective behavior. Drug therapy's effects were considered alone and in combination with the instructional approaches. Pre- and post-test measures of error and time were compared for Ss on the Matching Familiar Figures Test, the coding subtest of the Wechlser Intelligence Scale for Children-Revised, and a school-related copying task. Results revealed a developmental trend toward reflection in hyperactive children. In contrast to previous research, it was found that Ss treated without drug therapy performed significantly better than Ss treated with stimulant drup therapy. The use of psychoeducational approaches was effective in altering Ss' impulsive responding. (CL)

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A COMPARISON OF DIFFERENTIAL TREATMENT APPROACHES FOR IMPULSIVE RESPONDING OF HYPERACTIVE CHILDREN AT TWO AGE LEVELS

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ABSTRACT

A COMPARISON OF DIFFERENTIAL TREATMENT APPROACHES FOR IMPULSIVE RESPONDING OF HYPERACTIVE CHILDREN AT TWO AGE LEVELS

by

Ronald Terry Brown

Purpose

The major purpose of this research was to identify the best approach for treating impulsivity in hyperactive children. The treatment approaches investigated were two psychoeducational procedures. These procedures were studied in two groups: children receiving stimulant drug therapy and children not receiving stimulant drug therapy. The effect of the treatment approaches at two different age levels was also studied in order to determine the best treatment approach for each age group of hyperactive children. At the same time, the presence of a developmental trend in impulsivity was evaluated in hyperactive children. This research concerned the general hypothesis that those children receiving stimulant medication and psychoeducational training would perform significantly better on school-related cognitive tasks than those children receiving no medication or psychoeducational intervention.

Methods and Procedures

To accomplish this purpose, subjects were children having behavior problems so severe that they were excluded from the public schools. All children were thoroughly screened and identified as hyperactive after rigorous diagnostic examinations by qualified psychologists and psychiatrists.

One hundred twenty hyperactive children at two age levels clinically diagnosed as hyperactive met the criteria for subject participation. Approximately one-half of each age group (eight-year-olds and thirteen-year-olds) was selected from the children receiving stimulant drug therapy while the other half was selected from the children receiving no medication. The major independent variables studied were age, drug-therapy condition, and psychoeducational treatment condition, while the dependent variables were the scores obtained from Kagan's Matching Familiar Figures Test, the coding subtest of the WISC-R, and a school related copying task. The children in each of the medication conditions were further assigned randomly to one of two psychoeducational treatment conditions designed to alter impulsive responding, modeling and direct instruction, or to a control condition. By the use of six dependent measures, each child was evaluated one week after he received the psychoeducationa intervention. To assess the relative endurance of any change

each child was again evaluated seven weeks after the training intervention sessions.

Results

Two measures, errors and time, were obtained from each of the psychometric tests. To ascertain whether differences occurred both before and immediately after treatment and then later, three separate 2(age) x 3(Treatment Condition) x 2(Drug Therapy Condition) multivariate analyses of variance were carried out. For any significant main effects, separate univariate analyses of variance were performed on each of the six dependent measures. Appropriate post-hoc comparisons were also performed for any significant main effects on univariate measures. Significant main effects occurred for age ($p < .001$) and for drug therapy ($p < .002$) in each analysis and for treatment condition ($p < .02$) in the second analysis.

Conclusions

The results indicated that the use of psychoeducational treatment approaches are of value in altering the impulsive responding of hyperactive children. Direct instructional strategies are most likely to be of value in ameliorating impulsive responding for both older and younger groups of hyperactive children.

The present finding that children treated without drug-therapy performed significantly better than those children treated with stimulant drug therapy has not been found

previously. One explanation for this present finding, and it is only conjecture, is that high dosages of stimulant drugs, which were characteristic of the amounts prescribed to the children participating in this study, are detrimental to the cognitive performance of hyperactive children on school-related tasks.

Consistent with the findings in follow-up studies of hyperactive children which suggests that hyperactivity diminishes at adolescence is the present finding that there is a developmental trend away from impulsivity in hyperactive children. In addition, these findings support the construct validity of error measures and raise questions about the use of latency measures in evaluating hyperactive children.

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CHAPTER I

Introduction

Hyperactivity is a disorder in children which is commonly encountered by psychiatrists, pediatricians, and educators. Although firm statistical data are lacking, some experts have estimated its incidence at five to ten percent of the elementary school population (O'Malley & Eisenberg, 1973). One of the hyperactive child's basic problems is an inability to sustain attention over long periods of time (Douglas, 1972). This problem is generally manifested in a number of ways, including short attention span, restlessness, poor interpersonal relations with peers, an inability to focus attention on social cues, and a relative inability to understand verbal instructions, particularly instructions of teachers (Sprague & Gadow, 1976).

That hyperactivity is detrimental to the child's ability to function adequately in the learning situation has been confirmed by a prodigious amount of empirical research (Cantwell, 1975; Douglas, 1974; Epstein, Hallahan, & Kauffman, 1975; Keogh & Donlon, 1972). In fact, Cantwell (1975) stated that young hyperactive children are actually characterized by an impairment in the development of

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learning strategies necessary for basic problem solving. Even in the assessment of hyperactivity, it has been recommended that an evaluation of the ability to regulate motor behavior appropriate to situational demands is more important than examination of general gross body movements (Csapo, 1972; Douglas, 1972; O'Malley & Eisenberg, 1973; Sprague, Barnes, & Werry, 1971).

Maccoby and her colleagues (Maccoby, Dowley, Hagen, & Degerman, 1965) found that hyperactive children had difficulties in the inhibition of motor activity when assigned specific tasks such as drawing a straight line or tracing geometric shapes, but that they were no more active than normal children of the same age during free play. Consistent with these findings, Juliano (1971) and Sykes, Douglas, Weiss, and Minde (1971) found that hyperactive children displayed more motor restlessness than their normal peers during performance on measures of attention, cognitive style, and concept attainment. Whalen and Henker (1976) have also suggested that specific performance, not the excessive activity level, is the most optimal treatment target. Douglas (1976) has stated that research is needed in specific cognitive training tasks with hyperactive children, especially research which includes a comparison of treatment methodologies. Thus, a crucial treatment approach is to identify and use psychoeducational procedures directed toward regulating behavior in specific learning situations. Therefore, the identification

of psychoeducational procedures directed toward regulating behavior in specific learning situations appears to be crucial to the optimum functioning of hyperactive children.

Another approach in the treatment of hyperactive children is an attack upon the hyperactivity itself with the use of drug therapy. A plethora of research has attested to the effectiveness of stimulant drug therapy (see review by Barkley, 1976). Recent research (Sprague & Sleator, 1976) has provided impressive evidence that the administration of low levels of stimulant drugs enhances the potential for maximum learning. Although research has demonstrated the effectiveness of stimulant drug therapy (Barkley, 1976; Sprague & Sleator, 1976), possible hazards and side effects have been described (Safer & Allen, 1975; Werry & Sprague, 1970). Thus one reason for the identification of effective cognitive and behavioral (that is, psychoeducational) procedures for regulating the disorders associated with hyperactivity is that the use of such procedures may avoid the possible side effects of drug therapy. However, it is possible that the most effective treatment for maximizing the child's learning is a combination of two approaches: psychoeducational procedures and drug therapy.

One of the behaviors characteristic of hyperactive children, and one which is in greatest need of regulation, is impulsivity (Douglas, 1976). Keogh stated that hyperactive children actually represent extreme examples of impulsive children described by Kagan (1965, 1966) because

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they make decisions too rapidly, fail to pause to consider possible alternatives, fail to reflect on possible consequences of a decision, and seize on the first response that comes to mind.

That hyperactive children represent this extreme example of Kagan's impulsivity (1965, 1966) has been verified empirically by several investigators (Brown & Quay, 1977; Campbell, Douglas, & Morgenstern, 1971; Cohen, Weiss, & Minde, 1972). In fact, Keogh & Donlon (1972) have recommended that school psychologists consider the presence of impulsivity to be necessary in the diagnosis of hyperactivity and that Kagan's Matching Familiar Figures Test be included in their assessment battery.

Kagan's Matching Familiar Figures Test (MFF) is considered to be "the primary index" for the assessment of reflection-impulsivity in children and has been used in an impressive body of empirical research. In the measurement of reflection-impulsivity, the MFF yields two measures, a latency measure and an error measure, with impulsive children having latency measures below the median and error measures above the median and reflective children having latency scores above the median and error scores below the median.

Kagan (1965, 1966) has conceptualized the cognitive style dimension of reflection-impulsivity as a dispositional characteristic. He has further characterized the impulsive child as being restless, distractible, hyperactive,

emotionally uncontrolled, risk-taking, gregarious, hyperaggressive, and retaliative (Kagan, 1965; Kagan, Rosman, Day, Albert, & Phillips, 1964; Kagan & Kogan, 1970). Further, the impulsive method of problem solving is characterized as

> ". . . likely to be associated with the execution of solution hypotheses that are incorrect. The impulsive child is apt to act upon his initial hunch with minimal reflection, carry through a false hypothesis mentally, and offer an answer without critical examination of its potential accuracy. The anxiety resulting from repeated failure, as a consequence of impulsive responding, could lead to generalized expectations of failure and withdrawal of involvement from intellectual tasks" (Kagan, 1965, p. 13).

Kagan stated that reflection-impulsivity is a function of age; that is, that there is a developmental trend toward reflection (Mussen, Conger, and Kagan, 1974). Brown and Quay (1977) found that young normal children differed from young hyperactive behavior disordered children on reflection-impulsivity as measured by Kagan's Matching Familiar Figures Test (1965). However, since they found no difference between older normal and older hyperactive behavior disordered children on the MFF, they suggested that behavior disordered children may become less impulsive with age. Brown and Quay (1977) suggested that one of the problems characteristic of young hyperactive behavior disordered children, may be a lag in the development of reflection. Weiss, Minde, Werry, Douglas, and Nemeth (1971) also found that their subjects became less hyperactive when they reached adolescence.

Because of its debilitating effects in thwarting the

children's efforts to adjust to the requirements of the school, impulsivity is one of the behaviors in greatest need of regulation. Epstein, Hallahan, and Kauffman (1975) suggested the modification of impulsive behavior is important to academic success because an impulsive disposition generalizes to many cognitive tasks and influences faulty performance. Furthermore, they suggested that impulsivity results in a social handicap. As Kagan (1966) pointed out, "Most teachers do not have a high tolerance for incorrect replies, and the peer group is prone to jeer at the child who impulsively blurts out obviously incorrect answers" (p. 359).

For normal children having impulsive dispositions, the modification of impulsive responding has been demonstrated. Several modeling procedures (Debus, 1970; Ridberg, Parke, & Hetherington, 1971), a reinforcement technique (Denny, 1973), and the training of teachers to be more reflective so that they could serve as reflective models (Yando & Kagan, 1968) have been demonstrated to modify impulsive responding in normal children. Palkes, Stewart, and Kahana (1968) also demonstrated that hyperactive children can be trained to respond less impulsively to the Porteus mazes.

Rationale for this Research

Hyperactivity, with its constellation of symptoms, interferes with the child's ability to function adequately

condition which interferes with a child's functioning in school. Thus, this condition interferes with the child's ability to receive maximum benefit from the educational process. Therefore, before the child can receive an optimal education, the hyperactive condition must be treated.

The stress induced by academic failure has reprucussions not only to future academic performace, but also to the self-concept. Gibby and Gibby (1967), in an experimental study in which they induced failure in young children, showed that stress resulting from failure in a significant task impaired cognitive functioning and reduced intellectual productivity. Failure also significantly lowered the child's self-concept.

Thus, the identification and evaluation of procedures to minimize the effects of hyperactivity and related disorders has implications for fostering mental health as well as academic success. Psychoeducational procedures which have the potential to increase achievement and feelings of competence also have the potential to prevent the development of mental health problems. Not only is such regulation important to learning, but also since the child's positive feelings about himself and the world are concomitants of his ability to learn effectively, regulation of impulsive behavior has important implications for mental health.

Statement of the Problem

The general purpose of this research was to identify

an effective approach for the regulation of impulsive behavior in hyperactive children. The first major purpose of this research was to compare the effects of (1) a specific training procedure for handling impulsivity, (2) a modeling procedure designed to modify impulsive responding, and (3) stimulant drug therapy (both alone and in combination with the other procedures) in regulating impulsivity in hyperactive, emotionally disturbed children. An additional aim was to evaluate these psychoeducational procedures at two age levels to ascertain whether their effectiveness (alone and in combination with medication) was related to age.

CHAPTER II

Review of Literature

The Influence of Modeling on Impulsive Responding

Although several methods for changing impulsive behavio have been suggested, modeling is the method which has repeatedly been employed and has been demonstrated to be successful for impulsive children from normal populations. For example, several investigators have found that impulsiv children from normal populations became more reflective after observing reflective models (Debus, 1970; Ridberg, Parke, & Hetherington, 1971; Yando & Kagan, 1968).

Studies of the influence of modeling on Matching Familiar Figures Test (MFF) scores of children diagnosed as hyperactive have not been conducted. However, Siegelman (1969) and Drake (1970) through their work with normal children, have provided valuable clues about the types of strategies that impulsive children can be taught through the process of modeling. They suggested that impulsive and reflective normal children use different search strategies in their responding to the Matching Familiar Figures Test. That is, reflective children tend to scan stimulus details, while impulsive children tend to view only the global picture. That training in the area of

attention-maintaining behavior is necessary for the modification of cognitive styles has been suggested by Siegelman (1969), since the MFF test requires attention to stimulus details (Heider, 1971; Kagan, 1965; Kagan, Rosman, Day, Albert, & Phillips, 1964). Meichenbaum and Goodman (1969) successfully employed a modeling procedure in which they taught impulsive children from a normal population to verbalize various problem solutions such as planning ahead, stopping to think, being careful, and correcting errors calmly.

Modeling has also been effective in modifying other behavior disorders such as social withdrawal (O'Conner, 1969), aggression (Fechtner, 1971), and speech disorders (Dykman, Ackerman, Clements, & Peters, 1971). These findings suggest that modeling may be an effective procedure for changing the impulsive responding of hyperactive children. A study of the effectiveness of modeling on impulsive responding on tasks similar to the ones required in the school setting would have direct implications for the use of a behavioral change strategy in a school setting.

The Influence of a Specific Task Training Instruction Procedure on Impulsive Responding

It has been well documented (Bem, 1967; Bergin, 1967; Premack, 1970) that impulsive behaviors can be lessened by interrupting the sequence of behaviors and thought

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rationale underlies treatment approaches which instruct children to think before they act. Instructional procedures designed to provide the child with a more reflective, and thus less impulsive, strategy for dealing with specific tasks have also been shown to be effective in changing impulsive behavior in normal children (Albert, 1970; Briggs & Weinberg, 1973; Heider, 1971; Schwebel, 1961). Heider (1971), comparing forced delay, increased motivation, and direct strategy instructions, found that the direct strategy instructions, which were designed to teach the child a reflective strategy, had the effect of increasing response time and reducing errors in lower class children.

One study of hyperactive children (Palkes, et al., 1968) found that specific task training procedures were effective in reducing impulsive responding on the Porteus Mazes. These findings were supported by several studies employing verbal instructional treatment procedures with normal children (Gagne & Smith, 1962; Kendler, 1960; Radford, 1966), thus suggesting the possible efficacy of overt self-verbalization over non-verbalization in diverse problem-solving tasks in hyperactive children. Spivach and Shure (1974), who devised and implemented an impressive program which employed language to shape thought and overt behavior, successfully demonstrated that hyperactive children with impulsive dispositions do not conceptualize alternative options prior to taking actions.

This finding supports Douglas' (1976) recommendation for training hyperactive children to use the strategy of "stopping, listening, and looking".

Although only one study (Briggs & Weinberg, 1973) can be found in which errors on the MFF were reduced by the use of a social reinforcement training procedure, much research has indicated a reduction of MFF errors by specific training or instruction in search strategies (Albert, 1970; Egeland, 1974; Heider, 1971; Meichenbaum & Goodman, 1971; Ridberg, Parke, & Hetherington, 1971; Zelniker, Jeffrey, Ault, & Parsons, 1972). Meichenbaum and Goodman (1971), for example, examined the effect of a cognitive self-instructional training procedure in altering the MFF responses of impulsive second-grade children. Results of their experiment indicated that although cognitive modeling alone was effective in increasing response time, a self-instructional training task procedure, in which the children were trained to scan for critical attributes of the figures, was superior to the modeling procedures in reducing errors on the Matching Familiar Figures Test. Thus, while techniques such as modeling and reinforcement have successfully altered the response latency of children characterized as impulsive only those techniques which have employed specific training in search strategies have been successful in enforcing response delay and in reducing errors in impulsive responding in normal children.

Test requires attention to stimulus details (Heider, 1971; Kagan, 1965; Kagan, Pearson, & Welch, 1966; Odom, 1971). Thus, children who respond impulsively are apparently deficient in their attention to such details of the stimuli. Previous findings suggest that training hyperactive children to be more attentive to stimulus details, that is, to stop, look, and listen, should facilitate their performance on specific tasks.

The Influence of Stimulant Drug Therapy on Impulsive Responding

Much empirical research on the use of stimulant medication attests to its effectiveness (Gallagher, 1970; Grinspoon & Singer, 1973; Kroger & Safer, 1974). A number of variables have been related to the drug responsiveness of hyperactive children. Barkley (1976) examined 36 previous research reports involving over 1,400 hyperkinetic children in an effort to determine which variables have proven useful in predicting which hyperkinetic children would respond favorably to stimulant medication. He concluded from this review that attention span and concentration are particularly affected by stimulated drugs.

Recent research has provided clinicians with valuable information as to level of stimulant drug therapy that appear to be optimal for enhancing learning situations. Methylphenidate (ritalin), a stimulant drug widely prescribed to alter the inattentional, impulsive behavior

of hyperactive school children, has been clearly demonstrated to improve those attentional deficits found in most children diagnosed as hyperactive. One impressive finding (Sprague & Sleator, 1977) indicates that different dosages of methylphenidate produce differential results in altering impulsive behaviors of hyperactive children. This research has demonstrated that learning performance in children is enhanced by restricting the dosage range of methylphenidate to low levels, with peak results obtained by administering merely 0.3 milligrams per kilogram of body weight. Of prime importance was the finding by Sprague and Sleator (1977) that high dosages of methylphenidate was detrimental to the learning of the academic materials presented in the classroom, while low dosages dramatically enhanced learning potential. The finding that low levels of stimulant medication are necessary in maximizing learning potential has implications for diminishing some of the hazards encountered in the use of stimulant drug therapy (Gallagher, 1970; Grinspoon & Singer, 1973; Krager & Safer, 1974).

Although stimulant drug therapy alone may be effective in mediating the attentional spans or concentration levels of hyperkinetic children, it is most often used in conjunction with other therapeutic techniques. Sprague, Christensen and Werry (1974) have reported the effects of a stimulant medication (methylphenidate) in combination with operant conditioning in reducing in-seat motor activity. Methylphenidate alone did not reduce motor activity. The

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difference between the drug alone treatment and the combined drug and operant conditioning treatment approached significance. Because the difference did not reach statistical significance, the results remain unclear. Christensen (1975) suggests that "the additive use of stimulant medication produces few additional benefits" (p. 274). Gittleman-Klein and her colleagues (Gittleman-Klein, Klein, Abikoff, Katz, Gloisten, & Kates, 1976), studying children reported to be hyperactive in school and behaviorally difficult at home examined the effects of three treatment conditions: (1) methylphenidate, (2) behavior therapy and placebo, and (3) behavior therapy with methyphenidate. They found a significat advantage for the group receiving methylphenidate over the group receiving a combination of behavior therapy and placebo. No significant differences between methylphenidate combined with behavior therapy were obtained. Although the experimenters found gains as a result of all three treatments, methylphenidate was significantly superior to behavior therapy alone. The fact that no untreated group of hyperactive children was evaluated makes it impossible to evaluate the degree of improvement induced by any of the experimental treatments against the effects of time alone.

Objections have been made to the use of long term stimulant drug therapy because of the possibility of deleterious side effects (Safer & Allen, 1975). Grinspoon and Singer (1973) have suggested that behavioral techniques are the treatments of choice with hyperactive children and

have recommended that medication be used as a last resort. Werry and Sprague (1970) have recommended that pharmacotherapy in the treatment of hyperactivity be undertaken only when behavior modification techniques are not possible. They did not consider the use of other psychological techniques.

The results of these studies have generally shown that while stimulant drug therapy does play an important role in mediating the attentional deficits often found in hyperactive children, its therapeutic effect when combined with other behavior management techniques is probably most effective in altering the general behavior of hyperactive children. A comparison of psychoeducational procedures and drug therapy, both alone and in combination, on impulsive responding in hyperactive children would assist clinicians and educators by providing them with information on the efficacy of the several procedures.

The present study had several purposes. The first major purpose of this research was to investigate the effect of differential treatment approaches on the impulsive responding of hyperactive children to a cognitive task and to evaluate the generalizability of the behavioral change to other cognitive tasks. The treatment approaches included two psychoeducational procedures both of which were studied with and without the addition of drug therapy. Thus, the specific treatment procedures to be investigated were (1) modeling of reflective behavior, (2) an instructional

strategy designed to increase reflective behavior, (3) drug therapy alone, (4) drug therapy combined with the instructional and modeling strategies.

Another purpose of this research was to investigate the effect of age on the treatment approaches in order to ascertain the best treatment approaches available for two age groups of hyperactive children. At the same time, the presence of a developmental trend in reflection-impulsivity was evaluated in hyperactive children. Since there is a developmental trend toward reflection in normal children, a study of the developmental trend of impulsivity-reflectivit in hyperactivity was deemed necessary in understanding whethe they learn to use the same strategies as a function of age alone, or whether it is necessary to train them in this process.

In summary the following problems were investigated by this research:

1. Hyperactive children at two age levels who were receiving stimulant drug therapy and hyperactive children who were not receiving drug therapy were compared on their impulsive-reflective responding to the Matching Familiar Figures Test and to two other cognitive tasks as a function of two psychoeducational treatment procedures: modeling and specific task instructions.

2. Developmental trends on reflection-impulsivity were investigated in hyperactive children.
3. Interactions among all variables (age, treatment strategies, and medication) were evaluated.

Research Hypotheses

This research concerned the general hypothesis that those children receiving stimulant medication and psychoeducational training would perform significantly better than those children receiving no medication or psychoeducational intervention.

Specifically it was hypothesized that:

1. The older group of hyperactive children would perform significantly better on each of the psychometric assessments.
2. Those children being treated with stimulant drug therapy would perform significantly better on each of the psychometric assessments.
3. Those children receiving psychoeducational treatments would perform significantly better on each of the psychometric assessments.
4. There would be a significant interaction between the effects of stimulant medication and psychoeducational intervention.

CHAPTER III

Method

Population and Setting

Hyperactive children were selected from seventeen centers from the Georgia Psychoeducational Network. They were placed into the psychoeducational centers after a rigorous diagnostic examination by qualified psychologists and psychiatrists and a history of difficulty in coping with the regular school program. No child with obvious physical defects was included in the sample.

Criteria for Subject Participation

Written consent from a parent or legal guardian was a requisite for the child to participate in this research (see Appendix F).

After parental permission was obtained, 185 children were thoroughly screened and diagnosed for hyperactivity by the primary investigator. To be included in this research, a child must have shown the following characteristics: (1) He must have been diagnosed as hyperactive or presented problems associated with hyperactive child syndrome including excessive activity level, attentional problems, and impulsivity. To assure that each child met these

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criteria permanent records were examined thoroughly by the investigator. In addition, the error measure that each child obtained in the Matching Familiar Figures Test must have been two standard deviations above the means found for normal children, which were obtained in a previous pilot study (Brown & Quay, 1977), thus assuring the selection of only impulsive subjects. (2) Each child's pediatric examination must have been negative for other major diseases and obvious physical defects. Records of peidatric examinations were obtained from the child's permanent record. (3) The child must have obtained an IQ of at least 85 (full-scale) on the Wechsler Intelligence Scale for Children - Revised (Wechsler, 1972).

Sixty-five children did not meet these criteria for subject participation and were eliminated from further study.

Subjects

One hundred twenty children, 60 from each of two age groups, met the criteria for subject participation. The mean age of the older group was thirteen years, two months. The mean age of the younger groups was eight years, three months. Subjects were 114 males and four females. Two older males later refused to participate in the study, and thus were excluded from the research.

Pre-tests

All children were administered the following pre-tests:

(a) Matching Familiar Figures Test, Form 1 (Kagan, 1965).

This test consists of twelve tasks. Each task contains one stimulus picture and a separate array of six pictures, one of which is identical to and five of which are variations of one stimulus picture. The child is required to select the identical picture. He is allowed to select pictures from the array until he selects the identical one. His errors are recorded and the time it takes for him to make the first response (latency) is recorded. Errors and latency scores are averaged over the twelve tasks. The child thus receives two scores: error and latency. Both scores are considered in the assessment of reflection-impulsivity (see Appendix A for examples of the twelve MFF tasks).

(b) The coding subtest of the WISC-R (see Appendix B for example).

The scoring procedure differed from the standard WISC-R in that subjects received both an error score (total possible = 100) and a time score (total possible = 600 seconds).

(c) A school related copying task (see Appendix C for an example).

Letters and numbers were projected on a wall and children were required to copy them. Subjects received an error score (total possible = 100) and a time score (total possible = 600 seconds).

All children were tested individually. Instructions and procedures for all tests are presented in Appendix D.

Treatment Conditions

The Drug Therapy Condition

Approximately one-half of each age group (eight-year-olds and thirteen-year-olds) was selected from the children receiving stimulant drug therapy while the other half was selected from the children receiving no medication. Each child's medication was regulated by his physician according to body weight and other factors considered to be important by the physician. Accurate records concerning drug treatment, dosage, and prescribing physician were kept by each of the centers. The primary investigator had access to these records at all times. Physicians were requested to confirm the accuracy of the records. Records of drug treatment and dosages were periodically evaluated to make certain that drug treatment was being continued by physicians as well as parents. The primary investigator reviewed the records and consulted with a physician to confirm the accuracy of the prescribed dosages. The majority of the children were being treated with methylphenidate (ritalin) and dexadrine.

It was recognized that random assignment of children to a drug therapy or no-drug therapy condition would have been ideal. However, the impossibility of such random assignment in an educational setting is apparent. Thus,

the sample for the drug therapy condition was selected from the population of children who were already receiving stimulant drug therapy, while the sample in the no-drug therapy condition was selected from the population of children who were not receiving drug therapy.

After the children at the two age levels were identified for the Stimulant-Drug Therapy and No-Drug Therapy treatment groups, all children were administered the pre-tests (to be described later). Then children from each group were randomly assigned to a control condition and to one of two psychoeducational treatment conditions, modeling or specific task instruction.

The Modeling Condition

Materials similar to those employed by Ridberg, Parke, and Hetherington (1971) were developed by the principle investigator. Two seven minute videotapes were prepared showing a nine-year old white male and a fourteen-year old white male responding to MFF items (Form 1) in a reflective manner. The models were trained to observe a covert signal from the experimenter given after 25 seconds, during which the model was looking closely at the standard and the various response alternatives, thereby providing behavioral cues characteristic of the reflective tempo. Within five seconds of noting this signal, the model indicated his choice, which was, for the six items, the correct alternative. The experimenter then responded, "Very good, that's right. Can you now tell me why you chose that one?"

Thus, the models were requested to verbalize their strategy during the interval after responding. For the six stimuli on the MFF, the verbalizations stressed (a) responding slowly, (b) avoiding choosing the first stimulus that appeared correct without checking the remaining stimuli, and (c) giving a description of the strategy (e.g. the model described how he checked back with the comparison standard frequently). The models also used a scanning strategy whereby they pointed to the standards, then pointed carefully to the other stimuli, and compared the stimuli with each other and with the standard before arriving at a decision. All children assigned to the modeling condition were exposed to the model of their respective age level one month after their first administration of the MFF. The instruction of Ridberg et al. (1971) were used (See Appendix D).

The results of a pilot study to test the appropriateness of the videotape and instructions indicated that 100% of the fifth and tenth grade children in this pilot study were able to comprehend the videotape and were aware of its purpose.

The Specific Task Instruction Condition

The procedures for this condition were similar to those used by Heider (1971). One month after their first administration of the MFF (pre-test), each child was given two instructions about how to perform on the task.

Instructions included the following directions:

1. To look back and forth between the standard and each figure, the screening strategy described by Ridberg et al. (1971) and;
2. To answer only after finding the way in which every single figure but one differed from the standard.

Three poster-board cards were displayed illustrating the verbal strategy presented by Douglas (1974) . . . "Stop, look, and listen!" (see Appendix E). Each child was requested to verbally repeat these instructions until they were memorized. The instructions for this condition are documented in Appendix D.

The Control Condition

For children in the control condition, all pre-test measures presented to children in the other conditions were administered. No treatment designed to reduce impulsivity was given. To control for the Hawthorne effect, children were shown twelve geometric shapes. The trainer spent approximately the same amount of time with the children in the control condition as he did with those receiving psychoeducational treatments.

Table 1 presents a summary of the conditions.

Table 1

Summary of Experimental Design With Hyperactive Children

on the Basis of Three Variables

	Stimulant-Drug-Therapy			No-Drug-Therapy		
Treatment Approach	Modeling	Instruction	Control	Modeling	Instruction	Control
8-year-olds	n=8 (8)[a]	n=8 (7)	n=8 (7)	n=12 (12)	n=12 (11)	n=12 (12)
13-year-olds	n=7[b] (7)	n=8 (5)	n=7[b] (7)	n=12 (11)	n=12 (11)	n=12 (9)

[a]Numbers in parenthesis indicate the number of children who participated in the delayed post-test session (DPT).

[b]One male in each of these groups refused to participate in the study after pre-testing began.

N=118
(107)

Post-Tests

To ascertain whether immediate change resulted from the treatment, each child was tested one week after he received psychoeducational treatment. He was administered each of the tests: (a) The MFF (Form 2) which was constructed simply by rearranging the variants for each of the stimulus pictures, thus changing the position of the correct variant; (b) The coding subtest of the WISC-R; and (c) The school related copying task. All subjects were again given standard instructions (see Appendix D).

To evaluate the relative endurance of any changes, each child was again tested seven weeks after the psychoeducational training session. The same tests were administered during this delayed post-test session (DPT). Prior to the DPT session, a number of children involved in the research withdrew from the psychoeducational centers. Although it was still possible to follow up a number of these children through site visitations to their schools and homes, a number of children simply were not able to be located. Thus, only 107 children participated in the DPT session.

Design Limitations

It was recognized that random assignment of children to a Stimulant-Drug Therapy or No-Drug Therapy Condition would have been ideal in this experiment. Because this experiment was conducted in an educational setting, however

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the impossibility of such random assignment is apparent.

This procedure of selecting children limits the generalizability of the results to "hyperactive children for whom drugs have or have not been prescribed" rather than to all hyperactive children. However, since special educators and psychologists have no control over the prescribing of drugs and must work with children who come to them whether they are or are not on medication, this type of generalization of the findings about the effects of drug therapy is as important to the special educator and psychologists as a broader generalization on the effect of drugs on hyperactive children _per se_ would be.

CHAPTER IV

Results

Pre-test Analysis

Two measures, error and time, were obtained from each of the psychometric tests. Thus, there was a total of six dependent measures: Matching Familiar Figures Test (error and latency), WISC-R Coding Subtest measures (error and time), and the school related copying task (error and time).

Tables 2, 3, and 4 on the following pages present the means and standard deviations for each of the dependent measures.

The results of a 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) multivariate analysis of variance comparing all pre-test measures (MFF error, MFF latency, WISC-R Coding time, WISC-R Coding error, school related copying task time, and school related copying task error) were significant for age, F (1, 106)= 14.58, $p < .001$, and for drug therapy condition F (1, 106)= 3.70, $p < .002$. No significant main effect occurred for the treatment condition. This was obviously due to random assignment of subjects to psychoeducational treatments. Thus equality between groups was assumed before psychoeducational treatment intervention. No significant interactions occurred in the analysis.

Table 2

Means and Standard Deviations for MFF Latency and MFF Error Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Latency		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	43.50	19.46	27.00	8.38
Instruction	97.00	49.25	23.75	11.62
Control	91.75	39.92	23.13	7.92
13-year-olds				
Modeling	112.43	27.99	15.43	1.99
Instruction	84.75	29.10	17.50	8.55
Control	135.14	79.48	14.86	8.67
No-Drug-Therapy				
8-year-olds				
Modeling	93.33	42.03	20.33	8.61
Instruction	138.58	132.21	19.58	10.84
Control	98.17	54.85	20.50	8.10
13-year-olds				
Modeling	155.10	76.47	11.83	5.89
Instruction	115.25	61.33	13.17	6.34
Control	103.92	43.60	12.42	6.93

Table 3

Means and Standard Deviations for WISC-R Coding Time and WISC-R Coding Error Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Time		Error	
	Mean	SD	Mean	SD
Stimulant Drug				
8-year-olds				
Modeling	198.50	200.64	73.63	32.64
Instruction	305.75	238.15	57.63	48.73
Control	158.63	118.59	91.75	11.16
13-year-olds				
Modeling	382.00	148.68	27.29	29.97
Instruction	356.25	161.67	8.50	12.26
Control	326.86	159.94	27.71	44.56
No-Drug-Therapy				
8-year-olds				
Modeling	226.83	177.14	47.17	46.15
Instruction	307.50	251.65	57.50	35.29
Control	386.67	232.16	47.83	40.77
13-year-olds				
Modeling	401.17	105.43	6.67	11.87
Instruction	362.50	142.96	4.33	6.89
Control	373.92	111.59	1.33	1.44

Table 4

Means and Standard Deviations for School Related Copying Task Time and Error Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Time		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year olds				
Modeling	141.13	120.21	84.50	34.67
Instruction	228.38	225.03	62.83	42.80
Control	141.88	136.50	89.13	13.19
13-year-olds				
Modeling	343.57	204.75	11.43	16.56
Instruction	338.63	185.65	11.25	19.59
Control	212.43	94.91	29.71	45.77
No-Drug-Therapy				
8-year-olds				
Modeling	265.92	182.06	42.42	41.51
Instruction	305.08	215.99	35.75	43.80
Control	369.67	256.07	36.08	41.02
13-year-olds				
Modeling	337.75	159.87	5.83	10.62
Instruction	263.50	135.54	1.67	2.54
Control	262.08	108.32	4.92	7.37

Separate 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) univariate analyses of variance were performed for each of the six dependent measures. Tables 5 and 6 on the following pages present a summary of the results for these univariate analyses of variance performed on each of the six dependent measures. No univariate analyses of variance for the main effect of treatment condition are reported since the multivariate analysis of variance yielded a non-significant F for treatment condition.

The results of the univariate statistics performed on each of the dependent measures indicated that the 8-year-old hyperactive children differed from the 13-year-old hyperactive children on the error measures of each of the psychometric tests. The 13-year-old hyperactive children performed significantly better on each of the error measures. The 13-year-old hyperactive children performed significantly better than the 8-year-olds on only one of the time measures (WISC-R Coding subtest).

The results of univariate statistics performed on each of the dependent measures indicated that those children receiving no-drug-therapy performed significantly better than those children receiving stimulant drug therapy. This difference occurred on two of the error measures (MFF error and the school related copying task - error) and on two of the time measures (MFF latency and school related copying task--time).

Table 5

Summary of Analyses of Variances of Six Dependent Measures for the Main Effect of Age

Variable	df	MS	F
MFF-Latency	1,106	14273.23	3.32
MFF-Error	1,106	1945.93	29.28 **
WISC-R-Time	1,106	280172.75	8.83 *
WISC-R-Error	1,106	73349.19	77.13 **
School-Time	1,106	23310.48	.74
School-Error	1,106	60333.23	64.06 **

*$p < .004$.

**$p < .001$.

Table 6

Summary of Analyses of Variance of Six Dependent Measures for the Main Effect of Drug Therapy Condition

Variable	df	MS	F
MFF-Latency	1,106	16299.25	3.79*
MFF-Error	1,106	453.31	6.82**
WISC-R-Time	1,106	87650.81	2.76
WISC-R-Error	1,106	11316.34	11.90***
School-Time	1,106	20723.63	22.00***
School-Error	1,106	91828.63	2.91

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Post-Test Analysis

Tables 7, 8, and 9 on the following pages present the post-test means and standard deviations for each of the dependent measures.

Since there were no significant differences between groups for the main effect of treatment condition in the pre-test analysis, no analysis of covariance was necessary in the post-test analysis. To ascertain whether differences occurred immediately after treatment, a 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) multivariate analysis of variance was carried out on the post-test measures. For this analysis the dependent variables were all of the post-test scores: Matching Familiar Figures Test scores (latency and error), WISC-R Coding subtest scores (errors and time), and the school related copying task (errors and time). This first analysis was carried out on the post-test scores obtained one week after the psychoeducational treatments (modeling, specific task instructions, and control) were presented.

The results of this 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) multivariate analysis of variance comparing all post-test measures was significant for age $F(1, 106) = 17.44$, $p < .001$, and for drug therapy condition $F(1, 106) = 3.03$, $p < .009$. No significant main effect occurred for the treatment condition. A significant interaction occurred between the stimulant drug-therapy condition

and psychoeducational treatment condition $F(2, 106) = 1.91$, $p < .04$.

Table 7

Means and Standard Deviations for Post-MFF Latency and MFF error Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Latency		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	50.75	32.88	23.25	7.01
Instruction	116.88	59.08	18.63	7.31
Control	111.25	82.33	28.75	5.63
13-year-olds				
Modeling	168.14	101.64	13.57	6.73
Instruction	87.63	23.27	13.63	6.14
Control	124.86	82.65	16.14	7.40
No-Drug-Therapy				
8-year-olds				
Modeling	106.92	62.01	18.00	9.57
Instruction	101.67	80.78	19.33	8.88
Control	84.33	62.59	21.17	7.99
13-year-olds				
Modeling	162.67	95.58	11.33	3.87
Instruction	138.42	73.91	8.83	4.86
Control	92.75	51.06	13.75	9.09

Table 8

Means and Standard Deviations for WISC-R Coding Time and WISC-R Coding Error Post-Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Time		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	331.13	219.32	67.88	42.19
Instruction	374.88	174.08	40.00	40.06
Control	299.25	215.91	85.25	14.02
13-year-olds				
Modeling	446.71	134.64	5.14	8.19
Instruction	387.13	121.90	1.75	1.58
Control	267.14	178.14	27.00	44.45
No-Drug-Therapy				
8-year-olds				
Modeling	390.25	182.47	34.92	40.79
Instruction	369.17	180.99	39.25	38.09
Control	485.58	158.05	25.83	28.44
13-year-olds				
Modeling	388.00	124.49	4.42	8.59
Instruction	330.25	120.74	1.58	2.91
Control	351.17	101.67	2.92	4.62

Table 9

Means and Standard Deviations for School Related Copying Task Time and Error Post-Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Time		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	340.00	216.33	76.00	36.25
Instruction	388.00	192.23	48.63	38.78
Control	286.88	230.97	82.50	23.76
13-year-olds				
Modeling	305.43	157.98	1.29	1.38
Instruction	306.25	128.11	2.00	2.14
Control	179.86	81.92	25.71	43.13
No-Drug-Therapy				
8-year-olds				
Modeling	317.17	205.95	37.92	41.21
Instruction	319.58	142.67	34.08	34.97
Control	436.08	176.48	30.92	30.04
13-year-olds				
Modeling	339.75	134.13	5.67	10.60
Instruction	214.75	113.08	.58	1.16
Control	311.83	121.28	3.50	6.52

Separate 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) univariate analyses of variance were performed for each of the six dependent measures. Tables 10, 11, 12, and 13 on the following pages present a summary of the results for these univariate analyses of variance performed on each of the dependent measures.

The results of these univariate statistics performed on each of the dependent measures verify the findings obtained in the pre-test analysis. The 13-year-old hyperactive children performed significantly better than the 8-year-olds on each of the error measures.

The results of the univariate statistics performed on each of the dependnet measures indicated that those children receiving no-drug-therapy performed significantly better than those children receiving stimulant-drug-therapy. This difference occurred on each of the error measures and on the time measure of the school related copying task.

Although univariate statistics were not necessary for the main effect of treatment condition due to a nonsignificant F ratio for the main effect of treatmont condition which was found in the multivariate analysis, univariate F ratios were calculated simply for speculative puposes. The six univariate analyses of variance performed on each of the dependent measures yielded only one significant F ratio. This significant difference between treatment conditions occurred on the MFF error measure. The Tukey HSD paired-comparisons technique revealed that pairs of means were

different at the .05 level if they varied 3.36 or more. An inspection of the cell means indicated that the instructional and modeling psychoeducational treatment conditions differed significantly from the control condition for the 8-year-old children in the drug-therapy-condition. Furthermore, the instructional psychoeducational treatment condition differed significantly from the modeling psychoeducational treatment condition for those 8-year-olds receiving stimulant drug therapy. For the 13-year-old children in the no-drug therapy condition, the instructional psychoeducational treatment differed significantly from the control or modeling treatment conditions.

The results of the univariate statistics performed on each of the dependent measures indicated a significant interaction between psychoeducational treatment and drug-therapy. This interaction was significant for the WISC-R coding error measure and the school related copying task- time measure. An inspection of the data revealed that those children receiving drug therapy improved as a result of receiving both psychoeducational treatments whereas those children receiving no drug therapy received no such improvement.

Table 10

Summary of Analyses of Variance of Six Dependent Measures for the Main Effect of Age

Variable	df	MS	F
MFF-Latency	1, 106	34492.27	6.86**
MFF-Error	1, 106	2198.42	40.80***
WISC-R-Time	1, 106	14564.84	.57
WISC-R-Error	1, 106	46679.05	60.61***
School-Time	1, 106	14383.50	5.45*
School-Error	1, 106	53641.09	72.28***

* $p < .02$.

** $p < .01$.

*** $p < .001$.

Table 11

Summary of Analysis of Variance of Six Dependent Measures for the Main Effect of Drug Therapy Condition

Variable	df	MS	F
MFF-Latency	1, 106	1087.17	.22
MFF-Error	1, 106	360.58	6.29*
WISC-R-Time	1, 106	35261.99	1.37
WISC-R-Error	1, 106	10969.55	14.24**
School-Time	1, 106	12506.22	.47
School-Error	1, 106	12117.47	16.33**

* $p < .01$.

** $p < .001$.

Table 12

Summary of Analyses of Variance of Six Dependent Measures for the Main Effect of Treatment Condition

Variable	df	MS	F
MFF-Latency	2, 106	4841.18	.96
MFF-Error	2, 106	220.21	4.09*
WISC-R-Time	2, 106	6840.60	.27
WISC-R-Time	2, 106	1077.61	1.40
School-Time	2, 106	7653.23	.29
School-Error	2, 106	1386.70	1.87

* $p < .02$.

Table 13

Summary of Analyses of Variance for Six Dependent Measures for the Interaction of Treatment Condition and Drug Therapy Condition

Variable	df	MS	F
MFF Latency	2, 106	7643.74	1.52
MFF-Error	2, 106	21.88	.4[illegible]
WISC-R-Time	2, 106	72974.94	2.8[illegible]
WISC-R-Error	2, 106	4104.43	5.33**
School-Time	2, 106	116572.06	4.42*
School-Error	2, 106	2047.72	2.76

* $p < .01$.

** $p < .006$.

Delayed-Post-Test (DPT) Analysis

Tables 14, 15, and 16 on the following pages present the delayed-post-test means and standard deviations for each of the dependent measures.

To ascertain whether treatment differences were relatively enduring, a second multivariate analysis of variance was made on the same post-test scores obtained seven weeks after the first post-testing session.

The results of a 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) multivariate analysis of variance comparing all delayed-post-test measures was significant for age $F(1, 95) = 11.18$, $p < .001$, and for drug therapy condition $F(1, 95) = 2.59$, $p < .02$. No significant main effect occurred for the treatment condition. No significant interactions occurred in this analysis.

Separate 2(Age) x 3(Treatment Condition) x 2(Drug Therapy Condition) univariate analyses of variance were performed on each of the six dependent DPT measures. Tables 17 and 18 on the following pages present a summary of the results for these univariate analyses of variance. No significant F ratios were obtained for the main effect of treatment condition.

The results of these univariate statistics performed on each of the dependent measures verifies the findings obtained in the first two analyses. The 13-year-old hyperactive children performed significantly better than the 8-year-olds on each of the error measures and on the latency

measures of the MFF and the school-related copying task.

The results of the univariate statistics performed on each of the dependent measures indicated that those children receiving no-drug-therapy performed significantly better than those children receiving stimulant-drug-therapy on each of the error measures.

The analysis of the design for this research is outlined in Figure 1.

Table 14

Means and Standard Deviations for MFF Latency and MFF Error DPT Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Latency		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	51.88	32.19	24.25	8.73
Instruction	94.29	67.79	21.57	6.80
Control	115.71	136.51	37.14	32.15
13-year-olds				
Modeling	179.86	102.02	8.29	5.28
Instruction	91.80	47.09	15.00	7.84
Control	148.57	103.49	14.71	9.79
No-Drug-Therapy				
8-year-olds				
Modeling	88.67	44.61	18.67	13.45
Instruction	98.82	75.41	21.00	10.45
Control	95.58	73.46	18.33	6.96
13-year-olds				
Modeling	200.09	146.29	10.18	5.29
Instruction	165.82	141.89	10.55	6.19
Control	84.00	33.15	14.22	8.30

Table 15

Means and Standard Deviations for WISC-R Coding Time and WISC-R Coding Error DPT Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Latency		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	373.75	244.28	63.38	42.58
Instruction	327.57	236.47	48.29	48.08
Control	422.43	233.57	69.86	30.96
13-year-olds				
Modeling	455.43	146.48	2.00	2.38
Instruction	429.60	182.79	3.60	4.78
Control	328.14	110.08	24.71	38.30
No-Drug-Therapy				
8-year-olds				
Modeling	424.58	194.65	29.75	37.43
Instruction	426.82	185.88	28.18	41.41
Control	478.00	164.30	22.83	28.14
13-year-olds				
Modeling	381.73	123.27	7.36	15.00
Instruction	322.55	139.42	5.00	9.22
Control	402.33	101.83	4.00	9.41

Table 16

Means and Standard Deviations for School Related Copying Task Time and Error DPT Scores of Eight and Thirteen-Year-Old Hyperactive Children

Group	Time		Error	
	Mean	SD	Mean	SD
Stimulant-Drug				
8-year-olds				
Modeling	357.25	213.19	70.75	33.80
Instruction	311.14	231.20	53.00	47.73
Control	382.57	275.26	58.43	40.72
13-year-olds				
Modeling	339.86	191.13	1.71	2.36
Instruction	236.80	202.32	3.60	5.27
Control	205.57	96.65	23.00	37.83
No-Drug-Therapy				
8-year-olds				
Modeling	351.42	219.91	30.75	37.96
Instruction	344.55	165.71	23.82	35.83
Control	413.00	187.63	25.17	34.62
13-year-olds				
Modeling	329.00	142.73	3.46	8.55
Instruction	204.64	81.67	2.82	5.31
Control	296.00	137.24	3.33	5.07

Table 17

Summary of Analyses of Variance of Six Dependent Measures for the Main Effect of Age

Variable	df	MS	F
MFF Latency	1, 95	95409.63	10.73**
MFF Error	1, 95	3001.88	22.23**
WISC-R-Time	1, 95	36321.10	1.19
WISC-R-Error	1, 95	27912.94	30.72**
School-Time	1, 95	183644.25	5.54*
School-Error	1, 95	31121.92	35.44**

* $p < .02$.

** $p < .001$.

Table 18

Summary of Analyses of Variance of Six Dependent Measures for the Main Effect of Drug Therapy Condition

Variable	df	MS	F
MFF-Latency	1, 95	1953.73	.22
MFF-Error	1, 95	588.60	4.36*
WISC-R-Time	1, 95	10701.86	.35
WISC-R-Error	1, 95	10596.79	11.66**
School-Time	1, 95	660.90	.02
School-Error	1, 95	11839.69	13.48**

* $p < .04$.

** $p < .001$.

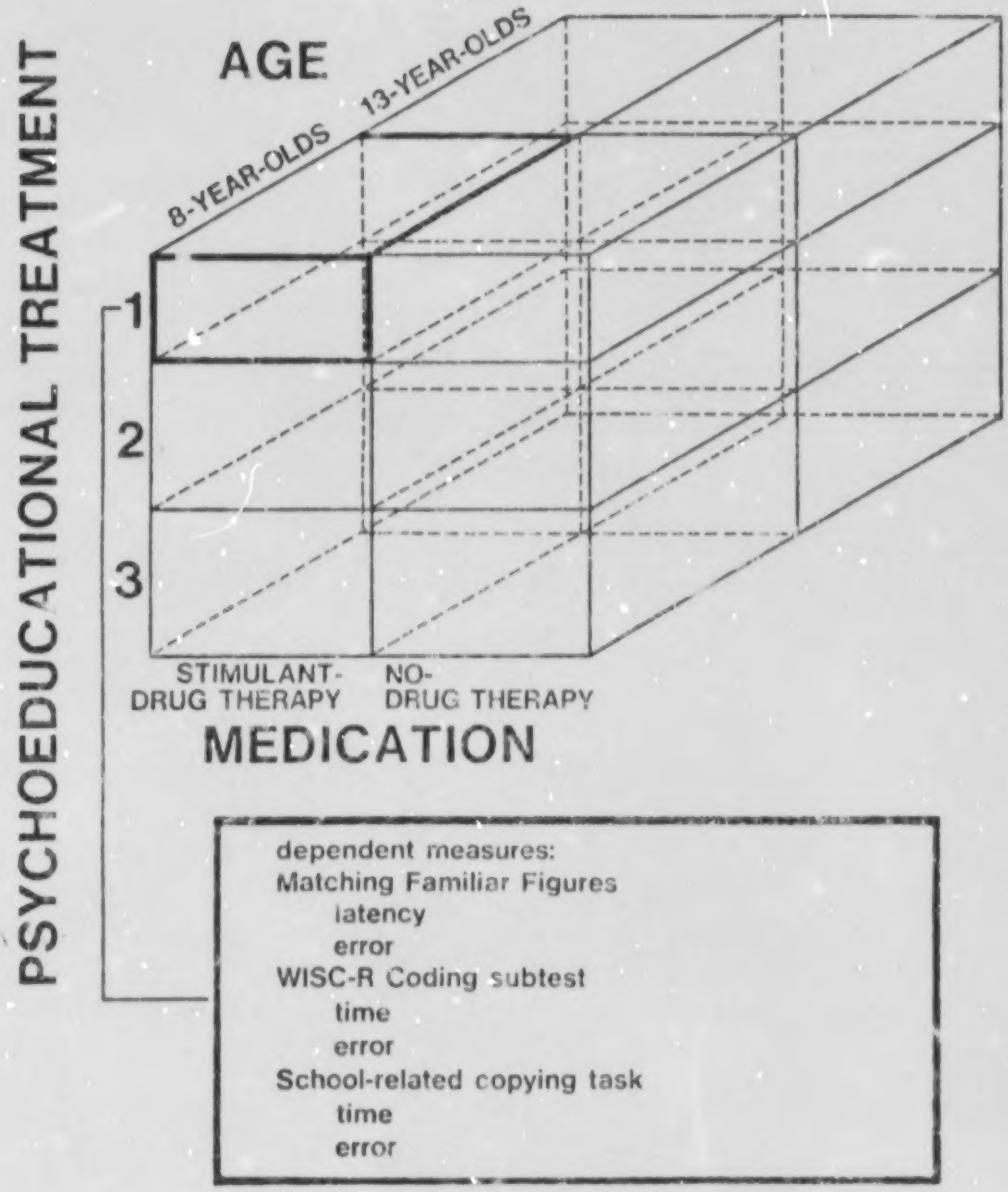

Figure 1. Multivariate analysis of variance with twelve cells and six dependent measures.

CHAPTER V

Discussion

The results indicated that there is a developmental trend toward reflection in hyperactive children. This finding is consistent with the results of follow-up studies which suggest that hyperactivity diminishes at adolescence. Although this developmental trend toward reflection has been verified empirically by this present research, impulsivity still remains a characteristic of adolescents identified as hyperactive. This result, in fact, is consistent with the findings of follow-up studies which indicated that hyperactive subjects became less hyperactive with age, although impulsivity remained a serious problem. (Weiss, Minde, Werry, Douglas, & Nemeth, 1971). The finding that there is a developmental trend toward reflection in hyperactive children is also consistent with the research conducted with normal children (Mussen, Conger, & Kagan, 1964; Quay & Weld, 1977).

In addition, the results indicated that the young hyperactive children differed from the older hyperactive children on the MFF error measure, but no difference occurred between the two groups on the MFF latency measure. Consistent with the results of previous investigations (Block, Block, & Harrington, 1974; Brown & Quay, 1977; Hallahan, Stainback, &

Ball, 1973; Quay & Weld, 1977) these findings support the construct validity of the MFF error measure but not that of the MFF latency measure. Furthermore, the finding that only one time measure was significant for the main effect of age, while the error measures on all the tasks were significant suggests that the use of time or latency measures in the assessment of hyperactive children is inconsequential and of dubious value. Thus, in the evaluation of hyperactive children, it is recommended that school psychologists consider error measures as an alternative to latency measures in their psychodiagnostic batteries.

The present finding that children treated without drug-therapy performed significantly better than children treated with stimulant-drug-therapy is inconsistent with previous research findings and is in direct contrast with the original hypothesis. This finding may be interpreted in two ways. One interpretation of this finding is that those children receiving stimulant-drug-therapy and those children receiving no-drug-therapy may be two distinct populations of hyperactive children. Given this assumption, those children who have been treated with stimulant-drug-therapy may exhibit stronger characteristics of the hyperactive child syndrome. Thus, this speculation might tend to support the finding that the hyperactive children in this study receiving stimulant-drug-therapy are more impulsive than their peers receiving no-drug-therapy. Because the subjects in this study provided an

adequate population from which to sample all hyperactive children, these findings further may be interpreted to suggest that pediatricians and child psychiatrists prescribe stimulant drug therapy to children characterized by a more severe type of hyperactivity. If this interpretation is correct, the psychologist and educator may find comfort in the fact that drug-therapy is not arbitrarily or capriciously administered, but its use may be restricted to those children having the severist difficulty.

A second interpretation of the finding that children treated without drug-therapy performed significantly better than those children treated with stimulant-drug-therapy, and it is only conjecture, is that high dosages of stimulant-drugs, which were characteristic of the amounts prescribed to the children participating in this study, are detrimental to the cognitive performance of hyperactive children on school-related tasks. This speculation is consistent with the findings presented by Sprague and Sleator (1977) which indicated that high dosages of stimulant-drug-therapy were deleterious to the learning of academic materials presented in the classroom. It is recommended that the present research be replicated with the use of random assignment to stimulant-drug-therapy or no-drug-therapy conditions (Brown, Note 1).

The Significant interaction between the drug therapy condition and the psychoeducational treatment condition indicated that the children receiving medication improved

on two of the measures as a result of both the modeling and instructional treatment approaches. There are two possible explanations for this finding. An obvious explanation might be that the medication itself interacted with the psychoeducational treatment to influence the change. However, an alternative explanation is that because the children in the drug therapy condition were more severely disturbed than the children in the no-drug-therapy condition, the improvement is a function of severity of disturbance. Further research is necessary to ascertain which explanation is correct.

The findings on the use of psychoeducational treatment approaches must be interpreted with caution, since only univariate analyses of variance, which examined the main effect of treatment, were significant. No significant treatment effect occurred for the multivariate analysis.

However, the results are suggestive that the use of psychoeducational treatment approaches are or possible value in altering the impulsive responding of hyperactive children. These findings suggest that the use of modeling and specific task instructions are effective in altering impulsive responding in young hyperactive children treated with stimulant-drug-therapy. Furthermore, the finding that the direct instructional psychoeducational treatment differed significantly from the modeling treatment condition in the univariate analysis suggests that a direct instructional procedure is the psychoeducational procedure of optimal choice in ameliorating impulsivity in young hyperactive

children who have been treated with stimulant-drug therapy. For the 13-year-old children in the no-drug-therapy condition, the instructional psychoeducational treatment significantly differed from the control or modeling treatment condition. This finding suggests that modeling procedures may be of dubious value in altering impulsivity in hyperactive adolescents and that psychoeducational treatment emphasizing direct instruction is the preferred treatment choice for this age group. These results must be interpreted with caution, however, since only the error measure on the Matching Familiar Figures Test yielded a significant F ratio. Thus, the psychoeducational training failed to generalize to other school related cognitive tasks. This finding might be interpreted to suggest that the training of hyperactive children should focus upon those specific behaviors which are designated as target behaviors. The finding that no significant treatment effect occurred in the delayed post-test session suggests that the treatment approaches in this experiment were simply too weak to endure.

It is recommended that additional research be conducted which evaluates the efficacy of long term psychoeducational training procedures on impulsivity in hyperactive children. Moreover, to assess the generalizability of psychoeducational intervention to dependent measures which are no-test-specific, it is recommended that researchers consider non-psychometric measures (e.g. teacher rating scales, reported classroom

behaviors, and videotape assessments) in the evaluation of treatment procedures. One such treatment intervention program has been proposed for implementation next year (Brown, Note 1).

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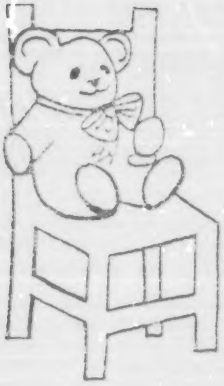
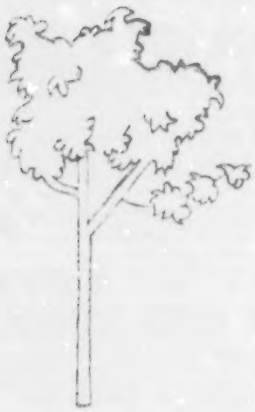
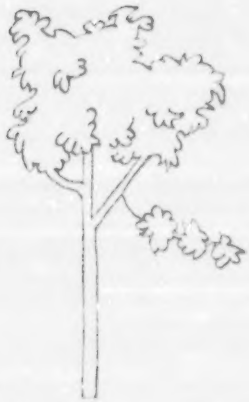
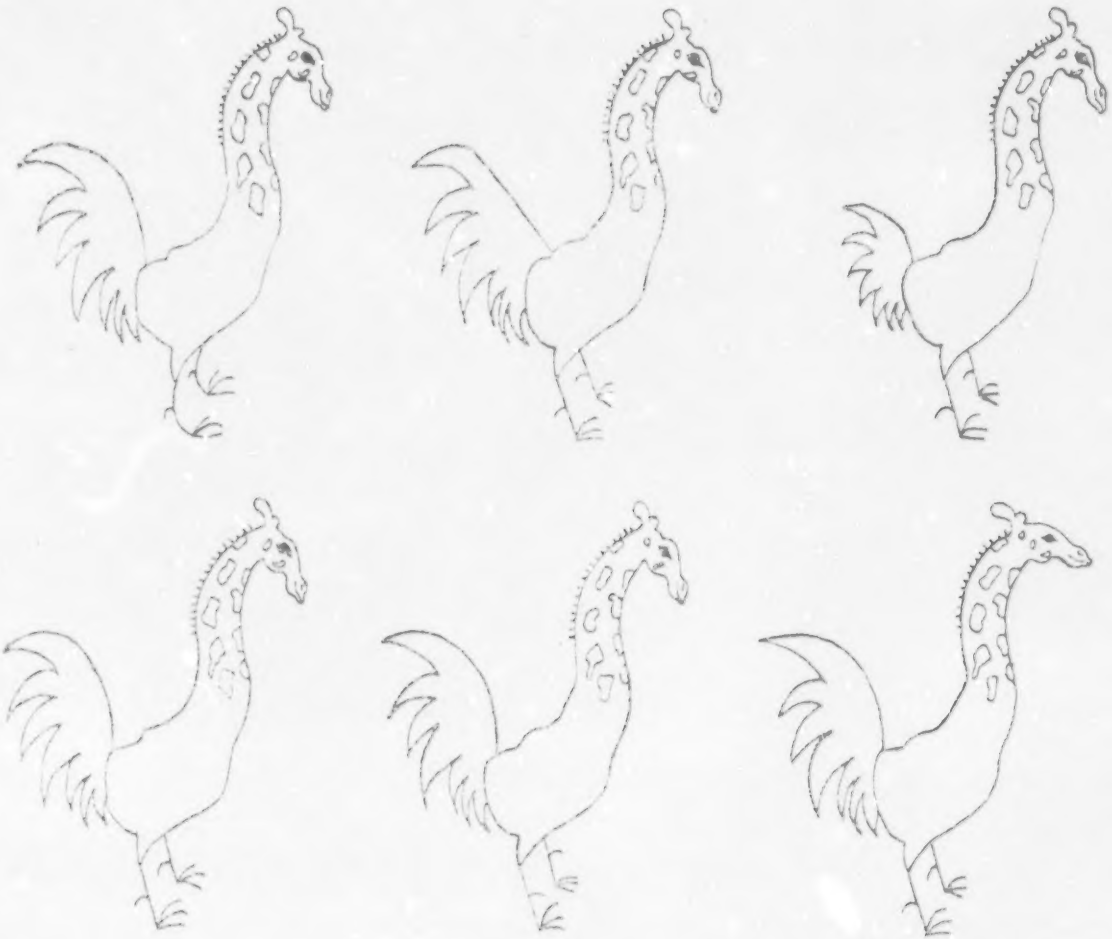
APPENDICES

APPENDIX A









MATCHING FAMILIAR FIGURES TEST - FORM I

Plate #	Figure	Error	Latency
1.	House (1)		
2.	Scissors (6)		
3.	Telephone (3)		
4.	Teddy Bear (1)		
5.	Tree (2)		
6.	Leaf (6)		
7.	Cat (3)		
8.	Dress (5)		
9.	Animal (4)		
10.	Lamp (5)		
11.	Boat (2)		
12.	Cowboy (4)		

Total

Error: _____

Latency: _____

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MATCHING FAMILIAR FIGURES TEST - FORM II

	Error	Latency
1. Scissors (1)		
2. Tree (5)		
3. Teddy Bear (3)		
4. Leaf (4)		
5. Lamp (1)		
6. Cat (3)		
7. Cowboy (1)		
8. House (4)		
9. Animal (5)		
10. Boat (1)		
11. Dress (5)		
12. Telephone (4)		

Total

Error: _____

Latency: _____

APPENDIX B

Coding Subtest of the WISC-R *

CODING B

(8-15)

2	1	4	6	3	5	2	1	3	4	2	1	3	1	2	3	1	4	2	6	3	1	2	5	1	
3	1	5	4	2	7	4	6	9	2	5	8	4	7	6	1	8	7	5	4	8	6	9	4	3	
1	8	2	9	7	6	2	5	4	7	3	6	8	5	9	4	1	6	8	9	3	7	5	1	4	
9	1	5	8	7	6	9	7	8	2	4	8	3	5	6	7	1	9	4	3	6	2	7	9	3	

* The scoring procedure for this task differed from the standard WISC-R in that subjects received both an error score (total possible =100) and a time score (total possible = 600 seconds).

APPENDIX C

School Related Copying Task

1. ce4 vcd a3f

2. pa5ora8a

3. simul9aneoys

4. envisa7e

5. gr2esque

6. 4imu2taneouslz

7. mnz bda vjx 3eh

8. dun8eon

9. fzv xjmn uvcy

10. vxy7c 3cm njx

Subjects received an error score (total possible =100) and a time score (total possible =100). Each symbol counted one point.

APPENDIX D

Instructions for Matching Familiar Figures Test

"I am going to show you a picture of something you know and then some pictures that look like it. You will have to point to the picture on this bottom page (point) that is just like the one on this top page (point). Let's do some for practice." Experimenter shows practice items and helps the child to find the correct answer. "Now we are going to do some that are a little bit harder. You will see a picture on top and six pictures on bottom. Find the one that is just like the one on top and point to it."

Experimenter will record latency to first response to the half-second, total number of errors for each item and the order in which the errors are made. If Subject is correct, Experimenter will praise. If wrong, Experimenter will say, "No, that is not the right one. Find the one that is just like this one (point)." Continue to code responses (not times) until the child makes a maximum of six errors or gets the item correct. If incorrect, Experimenter will show the right answer.

It is necessary to have a stand to place the test booklet on so that both the stimulus and the alternatives are clearly visible to the Subject at the same time. The two pages should be practically at right angles to one another. Note: It is desirable to enclose each page in clear plastic in order to keep the pages clean.

Instructions for Coding Subtest of the WISC-R:*

"Look at these divided boxes or square pointing to the Key. Notice that each has a number on the upper part and a mark on the lower part. Every number has a different mark. Now look here pointing to the Sample where the boxes have numbers, but the squares beneath have no marks. I want you to put in each of these squares, pointing to the seven Sample boxes the makrs that should go there like this." All makrs are to be made with a Number 2 red pencil.

Illustrate by pointing to the Key and then to the Sample, saying Here is a 2, so put in this mark writing in the symbol. Here is a 1, so you put in this mark. This is a 4, so you put in this mark. After marking the first three Sample items, say Now you do it. If the Subject does not grasp the task, help him with more items until the seven Sample items have been filled in.

After this demonstration, say Now begin here and fill in as many squares as you can without skipping any. Keep working until I tell you to stop. Go ahead. Begin timing. If the Subject starts to omit squares or do only one type of figure, say Do them in order.

Total errors = 100

Total time = 600 seconds

*Special directions for left-handed Subjects: Place a second record form before the subject folded so the relevant code (A or B) is showing, since a left-handed subject often covers the code with his hand when writing on this page.

Instructions for School Related Copying Task

Task was on a transparency and was projected on an overhead projector.

"Copy these letters and numbers, making as few mistakes as you can."

Subject will revise an error score (Total possible = 100) and a time score (Total = 600 seconds).

Instructions for Subjects in the Modeling Conditions:

"A few weeks ago you were in a study we were doing at school in which we were interested in how boys your age went about making decisions and solving problems. Remember we played a picture game in which you had to find one picture that looked jsut like another one? Well, we still are trying to pick those boys who seem to be best at solving these tasks."

For subjects in the model conditions, the experimenter continued: "However, from what we have seen so far, most of the boys had some trouble the last time. So to help you solve the problems I will be giving you today, I will first show you a film of a boy taking the same test you took last time. This boy did very well and made few mistakes."

Instructions for Subjects in the Instruction Condition:

A few weeks ago you were in a study we were doing at school in which we were interested in how boys your age went about making decisions and solving problems. Remember we played a picture game in which you had to find one picture that looked just like another one? Well, we still are trying to pick those boys who seem to be best at solving these tasks.

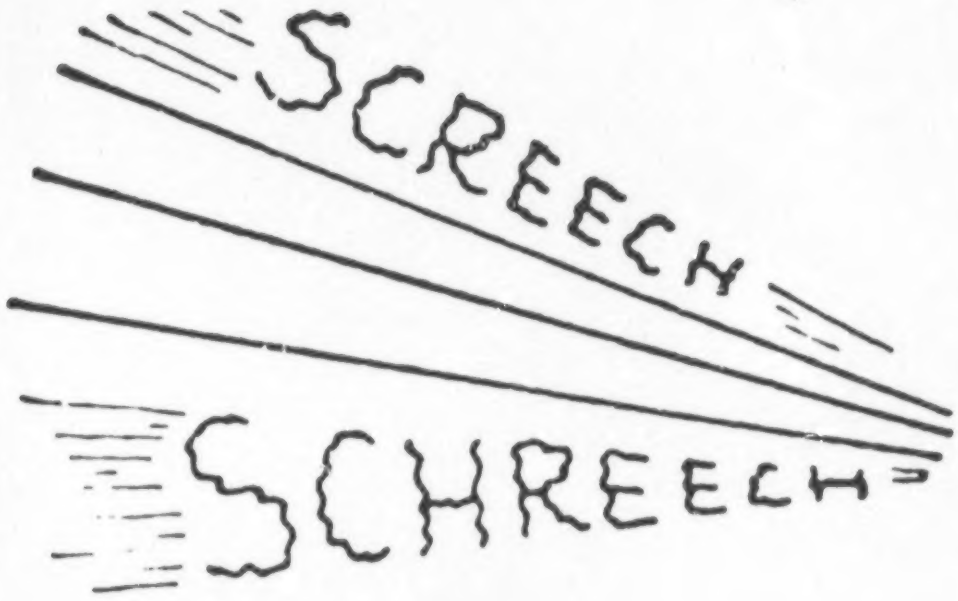
For subjects in the Instruction Conditions, the experimenter continued:

"However, from what we have seen so far, most of the boys had some trouble the last time. So to help you solve the problems that I will be giving you today, I will tell you three things to do:

1. Look back and forth between the top figure and each of the bottom figures.
2. Give me your answer when you have found the way in which every single figure but one is different from the top figure.
3. As you are working on each problem, look at the cards in front of you. They will remind you to STOP - LOOK - and LISTEN before you answer. Three poster-board cards were displayed illustrating the verbal strategy presented by Douglas (1974) . . . "Stop, look, and listen!" (See Appendix E). Each child was requested to verbally repeat these instructions until they were memorized.

APPENDIX E

Illustrations adapted from Palkes, H., Stewart, M., and Kahana, B. Poteus maze performance of hyperactive boys after training in self-directed verbal commands. Child Development, 1968, 39, 817-826.



Card 1

LOOK
LOOK
LOOK

LOOK
LOOK
LOOK

Card 2

LISTEN!

LISTEN

LISTEN

LISTEN

LISTEN

Card 3

APPENDIX F

GEORGIA STATE UNIVERSITY
University Plaza
Atlanta, Georgia 30303 658-2584

Department of Early Childhood Development

Informed Consent Contract

Dear Parent or Guardian:

I am currently engaged in a project designed to investigate how children and adolescents learn most effectively. Currently, this project is being conducted at the Centers from the Georgia Psychoeducational Network. The project is intended to provide schools with valuable information as to teaching techniques for various age groups of children. Your child if participating in the study, would be given a general intelligence test, and a task that would require him to match familiar figures. All results of the assessments will remain confidential. The project has been approved by the Administrative Board of the Georgia Psychoeducational Network. Your child will be informed of the nature of the project and of your informed consent. Should there be any further questions regarding the project, feel free to contact Ronald T. Brown at 658-2584. Thank you so much for your cooperation.

Sincerely yours,

Ronald T. Brown
Department of Early Childhood
Education

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I understand the above and agree to allow my child to participate in this study.

_____ _____

Parent or Guardian's Signature Date

I understand the above explanation and agree to participate in the study.

_____ _____

Child's Signature Date